SUBJECT INDEX

A

Aβ deposition
  Alzheimer's disease and, 54, 70–73
  isoform-specific binding of apolipoprotein E and, 71–72
Acetylcholine
  heterosynaptic LTD modulation and, 441
  ventral tegmental area dopamine–containing neurons and modulation of, 418–19
Acyclovir, 274
Addiction, 319–33, 405–6, 423–28
  possible dopamine system role in, 406, 423–28
    reinforcement effects and, 423–28
  possible sites of rewarding action, 328–33
  reward circuitry, 322
  self-administration and, 320
  (See also Brain stimulation reward)
Adeno-associated viruses (AAVs), 267
Adenosine 3′,5′-cyclic monophosphate (See cAMP)
Adenosine deaminase, 43–45
Adenovirus, 266–67
Adenylyl cyclase, 236, 522–23
  type III
    cAMP olfactory signal transduction pathway and, 522–23
Adrenal chromaffin cells
  mechanisms of exocytosis in, 221
n-Aequorin-J, 221
Affected Pedigree Member (APM) analysis, 65–67
AIDS, 1–20
  HIV-associated dementia and, 1–20
  (See also HIV, neurotoxicity)
AIDS-dementia complex (See HIV, neurotoxicity)
Alzheimer's disease, 53–73
  Affected Pedigree Member analysis of, 65–67
  APOE 4 and late-onset familial, 57–66, 72–73
  apolipoprotein E metabolism and, 53, 55, 67–73
    Aβ deposition and, 54, 70–73
    isoform specific effects of, 67–73
    MAP2 and, 55, 70–73
    tau and, 55, 70–73
  clinical phenotype, 53–55, 64, 68–73
    neuritic plaques and, 53–55, 64, 73
    neurofibrillary tangles and, 53–55, 64, 68–73
  early onset
    identified forms of, 61–62
  genetic heterogeneity of, 55–61
  herpes simplex virus type 1–mediated gene transfer and, 282
  linkage studies of, 61–64
γ-Aminobutyric acid (GABA)
  ventral tegmental area dopamine–containing neurons and, 417–18, 425–28
α-Amino-3-hydroxy-5-methylisoxazole-4-propionate (See AMPA)
AMPA, 36–37
Amphetamine, 327–33
Amplicons, 277–78, 281
  tyrosine hydroxylase gene transfer and, 281
Amygdala
  object vision and, 131–35
Amyloid precursor protein (APP), 54, 64
  in neuritic plaques, 54, 64
Amyotrophic lateral sclerosis, 187, 205–8
  neurofilament abnormalities and, 205–8
Anemone toxin, 155, 157
Anterior inferotemporal cortex
  afferents to, 119–24
  columnar organization of, 116–17, 119–31
    binding and, 130–31
    continuous mapping and, 129–30
    functions of, 129–30
    optical imaging of, 124–30
  selectivity of cells in, 110–16, 122–24
    changeability of 127–30
    position, orientation, and size in, 114–15, 122–24
    stimulus, 110–14, 116
  visual object recognition in, 109–36
Anterior middle temporal sulcus (AMTS)
  object vision and, 110, 134
α_1-Antichymotrypsin, 54
Apolipoprotein E (ApoE)
  Alzheimer's disease risk and, 53, 67–73
  intraneural localization of, 67–70
  isoform-specific interactions of, 67–68, 70–73
    Aβ peptide and, 71–72
    HDL receptor and, 67
    LDL receptor and, 67–68
    VLDL receptor and, 67
  metabolism of, 53, 67–73
  mRNA expression, 68
  neuronal metabolism and, 68–70
Apolipoprotein E locus (APOE), 53–73
  and Alzheimer's disease, 58–73
Apomorphine, 328
Apterous, 547
Arachidonic acid
  metabolites of
    HIV neurotoxicity and, 15–16
β-Arrestin (BARR), 526
Astrocytosis
  HIV-associated dementia and, 6
Attraction
  chemo-, 341–46
  contact-mediated, 341–46
  growth cone guidance and, 341–46
Axon guidance, 341–71, 556–60
  (See also Growth cone guidance)
Axonal cytoskeleton
  neurofilaments and, 187–208
Axonal transport, 187, 199–206
  of neuronal intermediate filaments, 199–206
Axonogenesis
  Drosophila, 545, 554, 556–60

B

β-arrestin (BARR), 526
Balint's syndrome, 597
BAPTA, 223–24, 450
  LTD induction with

blocking of, 450
Basal ganglia
striatum of
object vision and, 131–34
Becker's recessive generalized myotonia, 143
Behavior
cell firing and
ventral tegmental area dopamine–containing neurons and, 407–8
dopamine system and, 406–8, 425–28
drug addiction and, 425–28
Bis-(*o*-aminophenoxy)-*N,N,N',N'*-tetraacetic acid (See BAPTA)
Botulinum toxin
synaptic protein targeting by, 228–29
Brain-derived neurotrophic factor (BDNF), 290–309, 475, 477, 492–98, 510
basal forebrain cholinergic neuron survival and, 305
NT4 and, 497–98
receptors, 290–93
on neurons, 293
p75, 291–93
tyrosine kinase, 292–93
retinal ganglion cells and, 303–4
structure and biochemistry, 290–91
(See also Neurotrophins)
Brain stimulation reward, 319–33
addictive drugs and, 319–33
behavioral characteristics of, 322–23
habit-forming, 321
mesocorticolimbic dopamine system activation, 326–33
parameters of stimulation, 323–26
possible sites of rewarding action, 328–33
rate frequency function, 324–28
reward
antagonists, 326
circuitry, 322
synergists, 326–28

C

CA1
homosynaptic LTD in, 437, 442–58
Caffeine, 332
Calcium
growth cone guidance and, 366–67
LTD and LTP induction and, Ca^{2+} entry through NMDA receptors, 450–53
glutamate receptor activation and, 451–52
IP_3 production and, 451–52
phosphoinositide hydrolysis and, 451–52
voltage-gated calcium channels and, 452–53
Calcium channels, 171–81
dendritic
flourescence imaging studies, 171–72
hippocampal, 171–77, 181
patch-clamp studies, 171–75
endocytosis and exocytosis and, 221–23
membrane capacitance and, 222–23
long-term depression and, 179–80
long-term potentiation and, 179–80, 452–53
permeation properties of cyclic nucleotide–gated channels and, 234–44
plasticity and, 179–80
short-term potentiation and, 179–80
synaptic activation of dendritic voltage-gated, 175–77
synaptic integration and, 178–79
synaptic vesicle docking and fusion and, 225–27
synaptotagmin, 227
syntaxin-calcium channel complex, 226
voltage-gated 175–77, 452–53
long-term potentiation induction and, 452–53
Calmodulin, 366–67
cAMP
cyclic nucleotide–gated channels and, 235–36, 246–52, 255–58
olfactory signal transduction and, 522–25
components of transductional pathway, 522–23
pathway
learning and, 379, 394–98
cAMP-activated channels, 235–36, 246–52
cAMP regulatory element–binding protein (CREB), 467, 471–72
Cannabis
brain stimulation reward and, 328–33
Carbon monoxide, 525
Catabolite-activating protein (CAP), 246–47, 249, 256
cGMP
cyclic nucleotide–gated channels and, 235–39
olfactory signal transduction and, 525
GMP-activated channels, 235–39, 246–52
compared to voltage-gated channels, 238–39, 246–52
cIMP, 252
Cell adhesion, 341, 546–48, 561–62
Cell adhesion molecules (CAMs)
Drosophila neuromuscular junction and, 547, 562
growth cone guidance and, 343, 349–51, 364–65, 369–71
Cell recognition, 341–71
(See also Growth cone guidance)
Cell repulsion (See Repulsion)
c-*fos*, 470–71
Chemoaffinity hypothesis, 343
Chlolecystokinin octapeptide (CCK), 414–15
Clathrin, 230–31
Clonidine, 333
Ciliary neurotrophic factor (CNTF)
binding protein, 501–3
cytoplasmic tyrosine kinases and, 505–6
as injury response factor, 500–1
in retina, 501
intracellular signaling pathways and, 463, 474, 477–81
Clozapine, 414
CNTF (See Ciliary neurotrophic factor)
Cocaine
brain stimulation reward and, 328–33
Collapsin, 358–60, 547
Connectin, 347, 363, 547, 561–64
Cyclic inosine monophosphate (cIMP), 252
Cyclic nucleotide–gated (CNG) channels, 235–58
allosteric change in, 256–58
binding site, 246–52
Ca^{2+} permeability of, 236–37
cAMP and
varying selectivities for, 236
cGMP and
varying selectivities for, 236
channel properties, 240, 245–46
gating kinetics of, 252–56
modulation of, 257–58
molecular cloning of, 237–39
permeability of, 236–37

pore region structure, 240–46
potassium channel similarity, 240–43
conserved glutamate and ion permeation, 244–45
selectivity, 247–52
voltage-gated channels and structural homology with, 235
voltage-gated potassium channels
evolutionary connection to, 239
Cyclin-dependent kinase, 204–5
Cysteine string protein, 567
Cytisine, 331
Cytokine receptors, 491–92, 499–510
Cytokines, 491–92, 499–510
hematopoietic, 502–4
HIV neurotoxicity and, 13–15

D

Delayed response gene (DRG), 465, 471–72
Dementia
HIV-associated (See HIV, neurotoxicity)
Demyelinating polyneuropathies, 2
Dendrites
cerebellar Purkinje cell, 177, 181
hippocampal pyramidal neuron, 169–77, 181
neocortical, 177–78
plasticity and, 179–81
study of
overview, 166–69
synaptic integration and, 178–79
voltage-gated ion channels in, 171–77
density of, 172–73
synaptic activation of, 175–77
Dentate gyrus
heterosynaptic LTD in, 438–42, 454–58
Dentatorubral palliodoluysian atrophy (DRPLA), 79–82, 85–86
molecular mechanisms of, 97–101
neurodegeneration caused by, 79, 98, 100–1
parent-of-origin effect in, 92
repeat instability in, 93–94
Dephosphin, 230
Desmin, 188
Dopamine, 326–33
Dopamine-containing neurons
midbrain, 407–8
conditioned and unconditioned stimuli and, 408
neuroleptic-induced inactivation of, 423–25
subfamilies of, 410–12
ventral tegmental area
acetylcholine and, 418–19, 421–23
autoreceptor subtypes, 410–12
autoregulation of, 410–12
cell firing and behavior and, 407–8
characterization of, 408–10
excitatory amino acids and, 415–17, 421–23
GABA and, 417–18, 421–23
NMDA and, 416–17, 421–23
norepinephrine and, 420–23
serotonin and, 419–23
synaptic mechanisms that regulate firing of, 415–23
Dopamine system
mesocortolimbic, 405–28
drugs of abuse and, 425–28
stimulus-reward associations and, 406–8, 423–28
Dorsal root ganglion
NGF and, 294–300, 496–97
Drosophila
growth cone guidance in genetic studies of, 362–64
neuromuscular junction, 545–70
sodium channel
A-to-I editing of, 45
(See also Neuromuscular junction)
Drug addition (See Addiction)
dsRNA adenosine deaminase (See dsRAD)
dsRAD, 43–45
Dynamin, 230
Dystrophy
myotonic, 143

E

Electro-olfactogram (EOG), 527–29
Encephalitis
HIV, 2, 4–6
Endocytosis, 219, 221–23, 229–31
clathrin and, 229–30
dynamin and, 230
membrane capacitance and, 221–23
Epidermal growth factor family, 464, 466
Epitope map, 534–35
Excitatory amino acids, 415–17, 421–23
ventral tegmental area dopamine–containing neurons and, 415–17
Exocytosis, 219–25
calcium concentration necessary, 221
colocalization of calcium channels and vesicle fusion sites, 220
membrane capacitance, 221–23
activation of calcium current and, 222
rate of
calcium dependence of, 225
at synapses vs other, 219
synaptogamin and, 227
Expanded repeat disorders (See Polyglutamine repeat diseases, Trinucleotide repeat expansion)
Extracellular matrix, 342

F

Fasciclin
I, 561
II, 346, 348–49, 351–53
III, 547, 561, 563–64
Feline immunodeficiency virus (FIV), 18
Fibroblast growth factor (FGF), 464, 492–93, 510
Fluorescence imaging
dendritic Na^+ channels and Ca^{2+} influx and, 171–72
FMR-1 protein, 80, 94–95
Fragile X syndrome, 79–82, 86–89, 91–95
asymptomatic permutations of, 87, 91
molecular mechanisms of, 94–95
parent-of-origin effect in, 93
trinucleotide repeat size and disease severity, 91

G

G-protein α subunit
cAMP olfactory signal transduction pathway and, 522–24
G protein–coupled receptors
odorant receptors, 517–18, 520–22
Gancyclovir, 28
GAP-43/neuromodulin, 369
GDP, 468

Gene transfer
adeno-associated viruses, 267
adenovirus vectors, 266–67
herpes simplex type 1 vectors, 265, 267–83
Gene transfer therapy
potential targets of herpes simplex type 1–mediated, 281–83
Alzheimer's disease, 282
brain tumors, 282
Huntington's disease, 281–82
multiple sclerosis, 282
Parkinson's disease, 281
Glial-cell line–derived neurotrophic factor (GDNF)
motoneuron cell death prevention with, 303
Glutamate
control of ion permeation and, 244–45
Glutamate receptor mRNAs
A-to-I editing of, 36–45
AMPA and, 36–37
catalytic mechanisms of, 41–45
dsRAD and, 43–45
kainic acid and, 36
molecular mechanisms of, 41–45
NMDA and, 36
Glycosyl phosphatidylinositol, 502
Gonadotropin-releasing hormone, 364
Grb2, 468
gRNAs (See Guide RNAs)
Growth cone guidance, 341–71, 556–63
Drosophila, 556–60
mechanism for target selection, 558–60
genetic analyis, 360–65
mechanisms of
attraction, 341–46, 365–71
repulsion, 341–46, 365–71, 480–81, 546, 562–63
molecules
fasciclin II, 346, 348–49, 351–53
janusin/restrictin/J1-160-180, 347
myelin-associated glycoprotein (MAG), 347–48
netrins, 341, 346, 353–55, 369–71
neural cell adhesion molecules (NCAMs), 341, 346–51, 364–65, 369–71
proteoglycans, 347
repulsive axon guidance signal, 346, 480–81
semaphorins, 341, 346, 355–60, 363, 369–71
tenascin, 347
signal transduction, 365–71
calcium and, 366–67
calmodulin and, 366–67
GAP-43/neuromodulin and, 369
tyrosine kinases and, 366–69
tyrosine phosphatases and, 366–69
GTP, 468–69
Guanosine 3′,5′-cyclic monophosphate (See cGMP)
Guide RNAs, 29

H

Haloperidol, 414
Hereditary sensory motor neuropathy
neurofilament abnormalities and, 205
Herpes simplex virus type 1 (HSV-1)
gene transfer with, 265, 267–83
therapeutic targets for, 281–83
latency, 272–74
molecular biology of, 268, 271–72
as vectors for transgene expression, 265, 267–83
amplicons, 277–78, 281
gene product expression in vitro, 274–75
transgene expression in vivo, 278–79, 281
High-density lipoprotein (HDL), 67
amyloid precursor protein interactions with, 67
Hippocampus
ascending dopamine projections in, 405
dendrites of pyramidal neurons of, 169–77
action potentials in, 170–71
calcium channel types, 173–75
voltage-gated ion channels in, 171–77
long-term depression in, 437–58
synaptic activation of dendritic voltage-gated channels, 175–77
HIV, 1–20
animal models, 17–18
hypermutability of, 7, 8
neurological syndromes with, 2–4
neurotoxicity, 1–20
arachidonic acid and, 15–16
cytokines and, 13–15
HIV protein toxicity and, 13
mediators of, 12–18
NMDA receptors and, 12, 16
platelet-activating factor and, 15–16
quinolinic acid and, 16
(See also Neurotoxicity, HIV)
HIV-associated dementia, 1–20
pathogenesis of (See HIV, neurotoxicity)
HIV-associated polymyositis, 2
HIV encephalitis, 4–6
Honeybees
learning and memory in, 379–98
antennal response conditioning, 389
aversive conditioning, 386
conditioned stimulus, 385–86
dance communication, 384
foraging, 381–84, 389
navigation, 382–84
olfactory conditioning, 379, 384–98
sensory capacities of, 380–81
Huntington's disease
determinants of repeat instability in, 93–94
dominant inheritance of, 97
herpes simplex virus type 1–mediated gene transfer and, 281–82
molecular mechanisms of, 97–101
neurodegeneration caused by, 79, 98, 100–1
parent-of-origin effect in, 92
sporadic cases of, 92
trinucleotide repeat size and disease severity in, 90–91
Hydrocephalus resulting from stenosis of the aqueduct of Sylvius (HSAS), 364
8-Hydroxy-2-(di-n-propylamamino)tetralin (8-OH-DPAT), 419
5-Hydroxytryptamine (5-HT) (serotonin)
ventral tegmental area and, 419–20
Hyperkalemia, 144–50
sodium channel abnormalities in, 148–50
sodium channel mutations associated with, 145–50

structure-function correlation for, 153–54
Hypoxanthine guanine phosphoribosyltransferase (HPRT), 274, 278

I

IgG, 54
IL-6, 500, 509
Immediate-early genes, 465, 470–72
Incentive motivational processes
possible dopamine system role in, 406–8, 425–28
Infantile spinal muscular atrophy
neurofilament abnormalities in, 205
Inferotemporal cortex, 109–36, 598–612
anterior, 109–36, 598–612
posterior, 109–19, 119
visual object recognition and, 109–36, 598–612
(See also Anterior inferotemporal cortex)
Inflammation
link between pain and NGF and, 300–1
Insulin-like growth factors, 464
Intermediate density lipoprotein (IDL)
amyloid precursor protein interaction with, 67
Intermediate filaments, neuronal
(See Neuronal intermediate filaments)
Intraparietal sulcus
object vision and, 134–35
Ion channels
natural and site-directed mutagenesis in, 146–48
voltage-gated
hippocampal dendrites and, 171–81
(See also Calcium channel, Potassium channel, Sodium channel)
Ionomycine, 224, 230
IP_3
olfactory signal transduction and, 523–25
Isthmo-optic nucleus, 304

J

Janusin/restrictin/J1-160-180, 347

K

Kainate receptors, 36
Kainic acid, 36
Kallmann's syndrome, 364–65
Kenyon cells, 394–95
Kinases, 204–5

L

α-Latroxin, 227
Learning and memory
associative, 379–98
cAMP pathway and, 379, 394–98
hippocampus and, 437–58
function of long-term depression in, 456–58
in honeybees, 379–98
antennal response conditioning, 389
aversive conditioning, 386, 389
conditioned stimulus, 385–86
foraging, 381–84
genetic components of learning, 389–90
navigation, 382–84
olfactory conditioning, 379, 384–98
proboscis extension response, 387–93
unconditioned stimulus, 385–86
long-term depression and, 437–58
long-term potentiation and, 437, 439–58
reward-driven
ventral tegmental area dopamine–containing neurons and, 408, 425–28
Leukemia inhibitory factor (LIF), 478–79, 491, 500, 502, 505, 509
Lewy bodies, 64
Ligand-gated channels
cyclic neucleotide–gated channels, 235–58
(See also Cyclic nucleotide–gated channels)
Lipocalins, 519
Lipoproteins
amyloid precursor protein interactions with, 67–68
Long-term depression (LTD), 179–80, 437–58
function of, 456–58
heterosynaptic, 437–42, 454–58
acetylcholine and, 441
induction of, 439–41
modulation of, 441–42
NMDA receptor and, 441
norepinephrine and, 441
hippocampal, 437–58
homosynaptic, 437, 442–58
Ca^{2+} entry into dytosol, 450–53
expression and maintenance, 453–54
induction in vitro, 443–46
low-frequency stimulation–induced, 443–54
long-term potentiation induction and, 449
mechanism of induction, 450–53
regulation, 446–47
long-term potentiation compared to, 453–54
voltage-gated calcium channel and, 179–80
Long-term potentiation (LTP)
Ca^{2+} entry through NMDA receptor channel and, 450–53
compared to long-term depression, 453–54
hippocampal, 308–9, 437, 439–41, 445, 449–54
voltage-gated calcium channel and, 179–80
Low-density lipoprotein (LDL) receptor, 67–68
amyloid precursor protein interaction with, 67–68
Low-frequency stimulation
long-term depression induction and, 443–54

M

Macaque monkey
object vision in, 109–36
amygdala and, 131–35
anterior inferotemporal cortex and, 109–36
anterior superior temporal sulcus and, 131–35
intraparietal sulcus and, 134–35
perirhinal cortex and, 131–35
prefrontal cortex and, 131–35
striatum of basal ganglia and, 131–34
Machado-Joseph disease (MJD), 79–82, 86, 98
determinant of repeat instability in, 93
molecular mechanisms of, 97–101
neurodegeneration caused by, 79, 98, 101–1
Major histocompatibilty complex antigen 1, 275

MAPK (See Mitogen-activated protein kinases)
Medial forebrain bundle, 319
Memory
  hippocampus and, 456–58
  in honeybees, 379–98
  long-term, 386–87
  middle-term, 387
  olfactory conditioning and, 379, 384–98
  short-term, 387
  (See also Learning and memory)
Meningitis
  aseptic, 2
Mesocorticolimbic dopamine system, 326–33, 405–28
  brain stimulation reward and, 326–33
  drugs of abuse and, 406, 425–28
  stimulus-reward associations and, 326–33, 406–8, 423–28
Microtubule-binding proteins
  pathogenesis of Alzheimer's disease and
    MAP2, 70–73
    tau, 55, 70–73
Microtubules, 55, 70–71
Mitogen-activated protein kinase (MAPK), 470–71
Mononeuritis multiplex, 2
Motoneuron disease, 187, 205–8
  pathogenesis of
    neurofilament abnormalities and, 205–8
Motoneurons, 302–3, 545–70
  Drosophila
    cell recognition, 563–64
    cell repulsion, 562–63
    development, 548–50
    growth cone behavior and target selection, 558–60
    identity regulation, 553–54
  glial–cell line–derived neurotrophic factor
    prevention of motorneuron cell death with, 303
Murine AIDS, 18
Muscle
  Drosophila
    muscle differentiation, 548–50
    muscle pattern formation, 550–51
    neuromuscular junction, 546–70
  embryonic and neonatal
    nestin expression in, 192
Muscle fiber
  alteration in electrical excitability, 141–61
  disease-associated mutations, 145–48
  inactivation defect caused by, 148
  location of, 145–48
  sodium channel defects in, 141–61
Mushroom bodies, 379, 394
Myelin-associated glycoprotein (MAG), 347–48
Myelopathy
  HIV-associated, 3
Myogenesis
  Drosophila, 545, 548–52
Myotonia, 141–61
  Becker's recessive generalized, 143–44
  clinical presentation of, 142–45
  mutations in α subunit of skeletal muscle sodium channel, 141, 145–48, 150–51, 153
  myotonia congenita, 143
  myotonic dystrophy, 79–82, 89, 91–97, 143
    asymptomatic permutations of, 89, 91
    determinant of repeat instability in, 93–94
    molecular mechanisms of disease in, 95–97
    parent-of-origin effect in, 92–93
    pathophysiology of muscle dysfunction in, 96–97
    trinucleotide repeat size and disease severity in, 90–91
  para-, 143
  percussion, 142
  sodium channel inactivation defect in, 148–61
  sodium channel myotonias, 147

N

Natural killer stimulatory factor (NKSF), 506–8
Navigation
  honeybee, 382–84
Nematode
  growth cone guidance in genetic studies of, 361–62
Nerve growth factor (NGF)
  basal forebrain cholinergic neuron development and, 305
  chemotropism and, 343
  and dorsal root ganglion sensory neurons, 496–97
  intracellular signaling and, 464–81
  link between inflammation and pain, 300–1
  PNS sensory neuron development and, 294–97
  receptors, 291–93
    p75, 291–93
    tyrosine kinase, 292–93
  sphingomyelin hydrolysis and, 292
  sympathetic paravertebral chain development and, 302
  synaptic plasticity
    hippocampal, 308–9
    visual system, 306
  and TrkA, 496–97
Nestin, 188, 192, 198
  expression
    embryonic and neonatal muscle, 192
  properties, 198
  (See also Neurotrophins)
N-ethylamaleimide–sensitive factor (NSF), 226–27
Netrins
  growth cone guidance and, 341, 346, 353–55, 369–71
Neural cell adhesion molecule (NCAM)
  polysialic acid and
    growth cone guidance and, 343, 349–51, 364–65, 369–71
Neuritic plaques, 53–55, 64, 73
  as phenotype of Alzheimer's disease, 54–55, 64
  proteins found in, 54
Neurodegenerative diseases
  neurofilament abnormalities and pathogenesis of, 205–8
Neuroectoderm
  nestin expression in, 192
  vimentin expression in, 192
Neurofibrillary tangles, 53–55, 64–73
  apolipoprotein E and, 68–70
  dementia correlation to, 70
  as phenotype of Alzheimer's disease, 55, 64–73
  tau and, 55
Neurofilaments, 187–208
  axonal transport of, 187, 199–206
  kinases associated with, 204–5
  misaccumulation of motoneuron disease and, 205–8
  NF-H, 188–99, 201–8
  NF-L, 188–208
  NF-M, 188–208
  as obligate heteropolymers, 195–97
  phosphorylation of, 203–4
  radial growth of, 202–4

rate of transport, 200–2
(See also Neuronal intermediate filaments)
Neuroglian, 561
Neuromuscilin, 547
Neuromuscular junction
Drosophila, 545–70
axonal outgrowth, 556–60
founder cells, 550–53
motoneuron identity, 553–54
muscle differentiation, 548–50
myogenesis, 548–51
synaptic plasticity, 567–70
synaptogenesis, 560–66
Neuronal degeneration
apolipoprotein E and, 68–70
Neuronal intermediate filaments, 187–208
axonal transport of, 199–200
expression, 192–95
α-internexin, 188, 191–94, 197
in invertebrates, 191–92
misaccumulation of
motoneuron disease and, 205–8
nestin, 188, 191–93
NF-H, 188–99, 201–8
NF-L, 188, 208
NF-M, 188–208
peripherin, 188, 191–93, 198
phosphorylation of, 203–4
sequence information, 188–91
"side arms" of, 190
(See also Neurofilaments)
Neuronal metabolism
apolipoprotein E and 68–70
Neurotensin, 414–15
Neurotoxicity
HIV
arachidonic acid and, 15–16
cytokines and, 13–15
HIV proteins and, 13
mediators of, 12–18
NMDA receptors and, 12, 16
platelet-activating factor and, 15–16
quinolinic acid and, 16
Neurotransmitter release, 219–31
colocalization of calcium channels and vesicle fusion sites, 220
presynaptic active zone and, 220, 225–27
synaptic protein role in, 225–29
voltage-activated calcium channels and, 220
Neurotrophic factors, 289–309, 463–81, 491–510
ciliary neurotrophic factor, 477–81, 491, 499–510
collaborative, 491–510
neurotrophins, 289–309, 463–81, 491–99
(See also Brain-derived neurotrophic factor, Ciliary neurotrophic factor, Glial–cell line–derived neurotrophic factor, Nerve growth factor, Neurotrophins)
Neurotrophins, 289–309, 463–81, 494–99
ancestor gene, 290
brain-derived neurotrophic factor, 290–309, 475, 477, 492–98, 510
in CNS, 302–5
differentiation and, 465
nerve growth factor, 289–91, 343, 464–81, 491–97
neuroblast survival and, 465
p75 receptor and, 291–93, 494–95, 499
peripheral nerve regeneration and, 301–2
PNS sensory neuron development and, 294–302
proliferation and, 465
Ras-independent pathways, 473–77
Ras-MAP kinase pathway and, 468–73
second messenger cascades activated by, 293
sequential requirement of, 498–99
synaptic plasticity and, 305–9
hippocampal, 307–9
visual system, 306
Trk receptors and, 465–68, 493
tyrosine kinase receptor, 292–93
(See also Brain-derived neurotrophic factor, Nerve growth factor, Neurotrophic factors)
Nicotine, 319, 328–33
Nitric oxide
short- to long-term memory mediator, 379, 396–98
N-Methyl-D-aspartate (See NMDA)
NMDA
firing rates of ventral tegmental area dopamine–containing neurons and, 416–17, 421–23, 424–28
NMDA receptors, 12, 441, 445–54
Ca^{2+} entry through
LTD and LTP induction and, 450–53
heterosynaptic LTD modulation and, 441
HIV neurotoxicity and, 12, 16
homosynaptic LTD and, 445–54
low-frequency stimulation-induced, 445–54
Norepinephrine
heterosynaptic LTD modulation and, 441
ventral tegmental area dopamine–containing neurons and, 420–21
Nucleus accumbens
dopamine concentration in drugs of abuse and, 328, 330–33

O

Object recognition, visual, 577–614
perceptual categorization, 581–85
recognition by components theory of, 592
size and position, 587–88
task-specific representations, 585–87
viewpoint-invariant, 591
Object vision, 109–36
amygdala and, 131–35
anterior inferotemporal cortex and, 109–36
afferents to, 119–24
columnar organization of, 116–17, 119–31
selectivity of cells in, 110–16, 122–24, 134–35
basal ganglia and striatum of, 131–34
intraparietal sulcus and, 134–35
perirhinal cortex and, 131–35
prefrontal cortex and, 131–35
superior temporal sulcus and, 131–35
Octopamine, 392
Odorant-binding proteins, 519–20, 525–26
olfactory signal termination and, 525–26
Odorant receptors, 517–18, 520–22, 527–35
accentuated sequence diversity in transmembrane domains, 520, 522
diversity of, 520
gene expression
distinct spatial zones of, 529–30
large size of family of, 520
olfactory bulb patterning connections to, 533–35
Okazaki fragment, 94
Olfaction, 235–36, 517–38

cyclic nucleotide–gated channels and, 235–36, 243–58
calcium permeability through olfactory neuron channels, 243–44
odorant-induced activation of, 236
odorant receptors, 517–18, 520–22, 527
olfactory bulb, 517, 530–36
olfactory cortex
information coding in, 536–38
olfactory mucus, role of, 518–20
olfactory signal termination, 525–26
odorant-binding proteins and, 525–26
olfactory signal transduction
adenyl cyclase type III and, 522–23
cAMP and, 522–25
carbon monoxide and, 525
cGMP and, 525
cyclic nucleotide gated channel subunits and, 523–25
G-protein α subunit and, 522–24
IP_3 and, 523–25
(See also Odorant receptors, Olfactory bulb, Olfactory cortex, Olfactory epithelium)
Olfactory bulb
as epitope map, 534–35
information coding in, 530–36
odorant receptor patterning connections to, 533–35
olfactory epithelium patterning connections to, 532
sensory information processing in, 535–36
Olfactory conditioning
honeybees, 379, 384–98
neural substrates of, 390–93
proboscis extension response, 387–93
second-messenger pathways, 394–96
Olfactory cortex
anterior olfactory nucleus, 537–38
information coding in, 536–38
lateral olfactory tract, 536–37
Olfactory epithelium, 517–38
information coding in, 526–30
mucus coating properties, 518–20
lipocalins and, 519
odorant-binding proteins and, 519–20
odorant receptor patterning connections to, 532
olfactory neuron, 518
olfactory stem cells in, 518
sensory transduction in, 518–26
supporting cells (sustenacular cells) in, 518
Oncostatin M, 502
Optic ataxia, 597
Opiates
brain stimulation reward and, 319, 326–33
Opioid neurotransmitters
endogenous
food and behavior and, 320
Optical imaging, 109, 124–36
anterior inferotemporal cortex and, 124–36
Orientation, 379

P

p75, 475–77, 494–95, 499
PACAP, 548
Pain
NGF as link between inflammation and, 300–1
Paramyotonia congenita (PMC), 143, 145–55, 160–61
sodium channel mutations associated with
functional consequences of inactivation defect, 155–61
structure-function correlations for, 153–54
Parkinson's disease
herpes simplex virus type 1–mediated gene transfer and, 281
Patch-clamp techniques
dendritic property studies, 169–78
hippocampal dendrites
calcium channel types in, 173–75
ion channel density in, 172–73
neocortical dendrites, 177–78
Perirhinal cortex, 131–35
Periodic paralysis, 141–61
clinical presentation, 142–45, 147
hyperkalemic, 144–61
sodium channel mutations associated with, 145–50
hypokalemic, 144
skeletal muscle abnormalities
sodium channel defect with, 141–42, 145–61
Peripherin, 188, 191–93, 198
properties of, 198
Pertussis toxin, 366
Phencyclidine, 319, 328–33
Phosphodiesterase, 236
Phospholipase C pathway, 473
Plasticity
synaptic, 179–81, 305–9, 437–58
dendrites and, 179–81
hippocampal, 307–9
hippocampal long-term potentiation, 308–9
long-term depression, 437–58
long-term potentiation, 308–9, 437, 439–58
neurotrophins and, 305–9
visual system and, 306
Platelet-activating factor
HIV neurotoxicity and, 15–16
Platelet-derived growth factor (PDGF), 474–75, 492
Polyglutamine repeat diseases, 79–86, 90–94, 97–101
dominant inheritance of, 97
gain in function in, 97–98
molecular mechanisms of, 97–101
neurodegeneration caused by, 98, 100–1
(See also Dentatorubral-pallidoluysian atrophy, Huntington's disease, Machado-Joseph disease, Spinocerebellar ataxia type 1, X-linked spinal and bulbar muscular atrophy, Trinucleotide repeat expansion)
Polyglutamine tracts, 99
Polysialic acid (PSA)
and NCAM, 349–51
Potassium channel
evolutionary connection to cyclic nucleotide–gated channels, 239
modulation by cGMP, 239
pore region structure, 240–43
Prefrontal cortex, 131–35
Proboscis extension response, 387–93
Proctolin, 548
Proliferation, 465
Prospopagnasia, 594–96
Protein kinases
A (PKA), 525
β adrenergic receptor (BARK), 525–26
C (PKC), 394–97, 473, 525–26, 473
G protein–coupled receptor (GRK), 525–26
Proteoglycans, 347

Psychosis
possible dopamine system role in, 405–6, 423–28

Q

Quinolinic acid
HIV neurotoxicity and, 16

R

Radial growth, 187, 202–4
Ras, 468–70
Ras-MAP kinase pathway, 468–73, 480–81
Ras-triggered kinase cascade, 469–70
Recombinant proteins, 265
Repulsion, 341–46, 341–46, 365–71, 480–81, 546, 562–63
chemo-, 341–46
contact-mediated, 341–46
growth cone guidance, 341–46, 365–71, 480–81, 546, 562–63
Repulsive axon guidance signal, 346, 480–81
Retina
injury response in
ciliary neurotrophic factor and, 501
Retinal ganglion cells, 303–4
Reward (See Brain stimulation reward)
Rhodopsin, 236
Rop, 567

S

Sarcolemma
derangements in electrical excitability of, 141–42, 145
Schaffer collaterals
homosynaptic LTD in, 437, 442–54
Schizophrenia
possible dopamine system role in, 406
Second-messenger cascades
neurotrophin-activated, 293
Self-administration
addiction and, 320
(See also Brain stimulation reward)
Self-stimulation
intracranial
behavioral characteristics of, 320, 322–23
(See also Brain stimulation reward)
Semaphorins
growth cone guidance and, 341, 346, 355–60, 363, 369–71
Semaphorin II, 547, 561, 563
Sensory neurons, 294–302
Sensory transduction
olfactory (See Olfaction)
Serotonin (5-HT)
ventral tegmental area and, 419–20
Serum response factor (SRF), 470
Shc, 468
Short-term potentiation
voltage-gated calcium channel and, 179–80
Signaling cascades, 379
Signal transduction, 365–71
calcium and, 365–67
calmodulin and, 366–67
GAP-43/neuromodulin and, 369
tyrosine kinases and, 367–69
tyrosine phosphatases and, 367–69
Simian immunodeficiency virus (SIV), 9, 17–18
Simultagnosia, 597
Skeletal muscle
abnormalities in excitability of, 141–61
sodium channel mutations in, 141–61
hyperkalemia and, 145–48
inactivation defect caused by, 148
paramyotonia and, 145–48
Slipped-strand mispairing, 93–94
SNAP receptors, 226–27
SNAP-25, 226–27
SNAREs, 225–28
SNT, 474–75
Sodium channel, 141–61, 171–81, 242
dentritic
hippocampal, 171–77, 181
fluorescence imaging studies, 171–72
patch clamp studies, 171–78
plasticity and, 180
synaptic integration and, 178–79
mutations in
skeletal muscle abnormalities caused by, 141–61
Sodium channel mRNA
A-to-I editing of, 45
Soluble NSF-attachment proteins, 226
Sos, 468
Sphingomyelin hydrolysis, 292
Spinocerebellar ataxia type 1 (SCA1, 79–82, 84–85, 93–101
determinant of repeat instability in, 93–94
molecular mechanisms of, 97–101
neurodegeneration caused by, 79, 98, 100–1
parent-of-origin effect in, 92
transgenic mouse model for, 98
trinucleotide repeat size and disease severity in, 90–91
Stimulation reward (See Brain stimulation reward)
Substantia nigra, 406
Suc-associated neurotrophic factor–induced tyrosine–phosphorylated target (SNT), 474–75
Sulpiride, 414
Superior colliculus, 346
Superior temporal sulcus and anterior
object vision and, 131–35
Sympathetic neurons, 302
Sympathetic paravertebral chain
NGF and development of, 302
Synaptic plasticity
Drosophila motoneuron, 567–70
hippocampal, 179–81, 307–9
long-term depression and, 437–58
long-term potentiation and, 437, 439–58
neurotrophins and, 305–9
visual system, 306
(See also Long-term depression, Long-term potentiation)
Synaptic proteins
syntaxin-calmodulin channel complex, 227
targeting of
botulinum toxin, 228
tetanus toxin, 228
vesicle docking and fusion, 225–28
Synaptic transmission, 219–31
colocalization of calcium channels and vesicle fusion sites, 220
membrane capacitance and, 221–23
presynaptic active zones, 220
rate of exocytosis, 225
SNARE hypothesis of, 225–28
synaptic vesicle docking and fusion, 225–27
Synaptic vesicles
colocalization of calcium channels and vesicle fusion sites, 220
exocytosis, 219–25
fusion, 223–27

high internal calcium and, 223–25
Synaptobrevin, 226–28, 567
Synaptogenesis, 545–70
Drosophila
mutagenesis studies, 546, 560–64, 570
reverse-genetic method studies, 546, 560–64, 570
25-kDa Synaptosomal-associated protein (SNAP-25), 226–27
Synaptotagmin, 227–28, 567
Syntaxin, 226–27, 567

T

Target recognition, 341
Tau
in neurofibrillary tangles, 55, 70–71
Tenascin, 347
Tetanus toxin
synaptic protein targeting by, 228–29
Tetrodotoxin, 145, 170–71
Thomsen's disease, 143
Thymidine, 292
TMI, 39
TMII, 36–37, 39
Toll, 547
Trinucleotide repeat expansion, 79–101, 143, 281–82
determinant of repeat instability in, 93–94
molecular mechanisms of, 94–101
in myotonic dystrophy, 143
parent-of-origin effect, 92–93
polyglutamate stretch in, 97–101
aberrant transregulation model, 100–1
neurodegeneration caused by, 79, 98, 100–1
protein aggregation model, 100–1
transglutaminase cross-linking model, 100–1
repeat size and disease severity, 90–91
slipped-strand mispairing in, 93–94
type 1, 81–86, 90–94, 97–101
type 2, 81–82, 86–89, 91–97
(See also Dentatorubral-pallidoluysian atrophy, Fragile X syndrome, Huntington's disease, Machado-Joseph disease, Myotonic dystrophy, Polyglutamine repeat diseases, Spinocerebellar ataxia type 1, X-linked spinal and bulbar muscular atrophy)
Trk, 464–68, 473–81
receptor signaling, 466–68, 473
Trk family of receptors, 292–94, 302, 307, 466–68, 491–99, 505–10
ciliary neurotrophic factor and, 505–6
nerve growth factor and, 496–97
as neurotrophin receptors, 493–95
NT3 and, 497
Tyrosine hydroxylase gene transfer, 281
Tyrosine kinases, 367–69, 465
Tyrosine kinase receptors
Trk family of (See Trk family of receptors)
Tyrosine phosphatases, 367–69

V

VAMP, 226–28, 567
Vasculitis
peripheral nerve, 2
Ventral tegmental area (VTA), 405–28
dopamine-containing neurons of, 407–28
auto-regulation of, 410–12
neuroleptic-induced inactivation of, 423–25
reward-driven learning and, 408–28
Very low-density lipoprotein (VLDL) receptor
amyloid precursor protein interactions with, 67–68
Vesicle-associated membrane protein (VAMP), 226–28, 567
Vimentin, 188, 192, 196, 198
expression in neuroectoderm, 192
Voltage-gated channels
dendrites and
boosting distal synaptic events on, 178–79
hippocampal, 171–81
plasticity and, 179–81
structural homology with cyclic nucleotide–gated channels, 235–39

X

X-linked spinal and bulbar muscular atrophy (SBMA), 79–82
determinant of repeat instability in, 93–94
molecular mechanisms of, 97–101
neurodegeneration caused by, 79, 98, 100–1
X-linked pattern of inheritance, 97